

# Continued Development of Small-Pixel CZT and CdTe Detectors for Future High-Angular-Resolution Hard X-ray Missions

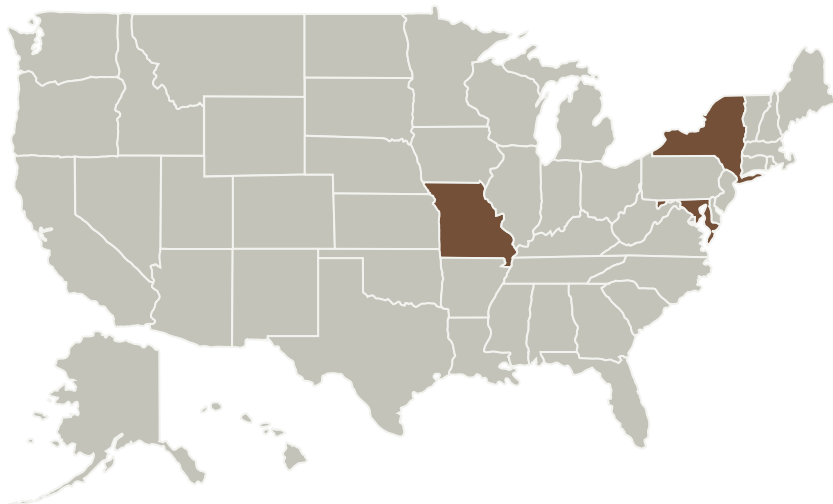
Completed Technology Project (2016 - 2019)



## Project Introduction

The Nuclear Spectroscopic Telescope Array (NuSTAR) Small Explorer Mission was launched in June 2012 and has demonstrated the technical feasibility and high scientific impact of hard X-ray astronomy. We propose to continue our current R&D program to develop finely pixelated semiconductor detectors and the associated readout electronics for the focal plane of a NuSTAR follow-up mission. The detector-ASIC (Application Specific Integrated Circuit) package will be ideally matched to the new generation of low-cost, low-mass X-ray mirrors which achieve an order of magnitude better angular resolution than the NuSTAR mirrors. As part of this program, the Washington University group will optimize the contacts of  $2 \times 2$  cm<sup>2</sup> footprint Cadmium Zinc Telluride (CZT) and Cadmium Telluride (CdTe) detectors contacted with  $100 \times 116$  hexagonal pixels at a next-neighbor pitch of 200 microns. The Brookhaven National Laboratory group will design, fabricate, and test the next generation of the HEXID ASIC matched to the new X-ray mirrors and the detectors, providing a low-power  $100 \times 116$  channel ASIC with extremely low readout noise (i.e. with a root mean square noise of 13 electrons). The detectors will be tested with radioactive sources and in the focal plane of high-angular-resolution X-ray mirrors at the X-ray beam facilities at the Goddard and Marshall Space Flight Centers.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

### Responsible Mission Directorate:

Science Mission Directorate (SMD)

### Responsible Program:

Astrophysics Research and Analysis

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Organizations Performing Work	Role	Type	Location
Washington University in St Louis	Supporting Organization	Academia	Saint Louis, Missouri

Primary U.S. Work Locations	
Maryland	Missouri
New York	

## Project Management

### Program Director:

Michael A Garcia

### Program Manager:

Dominic J Benford

### Principal Investigator:

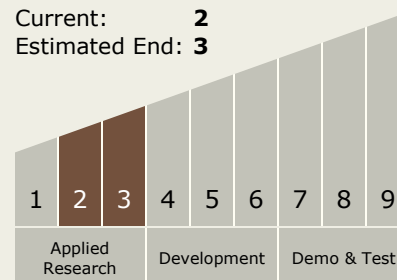
Henric S Krawczynski

### Co-Investigators:

Anna Zajczyk  
 William W Zhang  
 Gianluigi De Geronimo  
 Takashi Okajima  
 Shaorui Li  
 Stephanie P Bemberg  
 Fabian F Kislat

## Technology Maturity (TRL)

Start: 2  
 Current: 2  
 Estimated End: 3



## Technology Areas

### Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors

*Continued on following page.*

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## Technology Areas (cont.)

└ TX08.1.3 Optical  
Components

## Target Destination Outside the Solar System